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Realization of benefits under the United Nations Convention on the Law of the Sea: Needs of States in regard to development and management of ocean resources

Report of the Secretary-General

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I. INTRODUCTION

1. The General Assembly, by its resolution 44/26 of 20 November 1989, requested the Secretary-General, inter alia, to present to it at its forty-fifth and forty-sixth sessions a report identifying the needs of States in regard to the development and management of ocean resources and the measures currently taken by States and by the competent international organizations in responding to those needs, and to suggest methods and mechanisms for maximizing opportunities for the early realization for all States, during the decade beginning in 1990, of the benefits of the comprehensive legal régime established by the United Nations Convention on the Law of the Sea. 1/

2. The present report is the first part of the response to the General Assembly's request. It provides a review of the needs of States in the development and management of ocean resources under the régime established by the Convention. The second part of the response will provide an overview of the measures currently being taken by States and by the competent international organizations and, in response to the needs identified, will deal with methods and mechanisms for maximizing the opportunities of States for the realization, during the 1990s, of the benefits of the new ocean régime. That report will be presented to the General Assembly at its forty-sixth session.

3. In order to obtain the most accurate information on the needs of States, the Secretary-General, following the adoption of the above-mentioned resolution, sent a note verbale to all Member States of the United Nations and to Permanent Observers requesting such information. A letter was also sent to 35 competent international organizations requesting information for the same purpose. As at 31 October, the following 23 States and Permanent Observers had replied to the Secretary-General's communication: Barbados, Canada, Chile, China, Denmark, Germany, Honduras, India, Japan, Kuwait, Mali, Morocco, Nigeria, Oman, Philippines, Sri Lanka, Sweden, Switzerland, Thailand, Togo, United Republic of Tanzania, United States of America and Yemen. The following programmes and organizations of the United Nations system had also replied to the communications addressed by the Secretary-General: United Nations Conference on Trade and Development (UNCTAD); United Nations Development Programme (UNDP); Office of the United Nations Disaster Relief Co-ordinator (UNDRO); United Nations Environment Programme (UNEP); Economic Commission for Africa (ECA), Economic Commission for Latin America and the Caribbean (ECLAC) and Economic and Social Commission for Asia and the Pacific (ESCAP). Responses were also received from the following specialized agencies: Food and Agriculture Organization of the United Nations (FAO), International Civil Aviation Organization (ICAO), International Fund for Agricultural Development (IFAD), International Labour Organisation (ILO), International Maritime Organization (IMO), International Telecommunication Union (ITU), United Nations Educational, Scientific and Cultural Organization (UNESCO), Intergovernmental Oceanographic Commission of UNESCO (UNESCO/IOC), United Nations Industrial Development Organization (UNIDO), World Intellectual Property Organization (WIPO), World Meteorological Organization (WMO), World Tourism Organization (WTO) and the International Atomic Energy Agency (IAEA).

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4. The following international organizations also responded to the Secretary-General's communication: Forum Fisheries Agency (FFA); Organization for Indian Ocean Marine Affairs Co-operation (IOMAC); Organization of African Unity (OAU); Organization of American States (OAS) and Permanent Commission for the South Pacific (CPPS). The present report is based on the information provided in the above-mentioned responses. The Secretary-General wishes to acknowledge the value of all the contributions he has received.

5. The present report also utilizes the information contained in the reports of the representatives of various States presented at three recent international meetings dealing with relevant issues. The three international meetings are as follows:

(a) Conference on Economic, Scientific and Technical Co-operation in the Indian Ocean in the field of Marine Affairs in the context of the New Ocean Régime: The first ministerial-level meeting was held at Colombo, from 26 to 28 January 1987 and the second ministerial-level meeting, at Arusha, United Republic of Tanzania, from 3 to 7 September 1990. The following States were represented in the latter meeting: Australia, Bangladesh, Burundi, China, France, Federal Republic of Germany, India, Indonesia, Iran (Islamic Republic of), Italy, Kenya, Malawi, Malaysia, Mozambique, Nepal, Pakistan, Poland, Saudi Arabia, Seychelles, Sri Lanka, Somalia, Sudan, Uganda, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Union of Soviet Socialist Republics, Yemen, Zambia and Zimbabwe.

(b) The Expert Group Meeting on Sea Use Planning and Coastal Area Management (countries of the Latin American and Caribbean region, as well as other countries from outside the region of the activities that are relevant for the countries in the region), was held at Santiago, from 28 November to 1 December 1989. Reports were presented by: Brazil, Chile, Colombia, Costa Rica, Ecuador, Jamaica, the Netherlands, the United Kingdom and the United States of America.

(c) Meeting of the Group of Experts of States Members of the Zone of Peace and Co-operation of the South Atlantic - Implementation of the 1982 United Nations Convention on the Law of the Sea, especially with respect to the uses of the oceans and their resources (Brazzaville, 12-15 June 1990), at which reports were presented by: Argentina, Benin, Brazil, Cameroon, Cape Verde, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Namibia, Nigeria, Sao Tome and Principe, Senegal, Togo, Uruguay and Zaire.

6. Furthermore, the report takes account of resolutions adopted by intergovernmental bodies within the United Nations system and the deliberations of the General Assembly under the agenda item on the law of the sea. It also draws upon reports and publications of the United Nations system and of other international organizations, both global and regional, active in marine affairs. The annual reports of the Secretary-General to the General Assembly under the law of the sea item (A/43/718, A/44/650 and Corr.1 and A/45/563) provide information on the developments in marine related fields. Those reports and the present report should be treated as complementary in reviewing activities at the global level. The ongoing and prospective programmes and activities of the United Nations and its

agencies and bodies and of funding institutions active in the field of marine affairs are not covered in the present report.

7. The present report provides a review of the major requirements of States for development of the ocean sector. The applicability of the needs expressed in the review to any particular country would depend on the degree of its progress in marine sector development. The level of national activity reflects to a great extent the level of development of the countries concerned. As such, the needs of countries range from basic needs in the case of those which are not in a position to take or have not taken any substantial measures to develop the ocean potential provided by the Convention to those countries which have some capabilities and have taken early initiatives in securing jurisdiction over their extended maritime zones, adopting ocean development policies and implementing programmes and projects. To the extent that such a disparity exists in national experience, the report reflects the whole range of needs. In identifying needs, references in the report are sometimes based on the positive experiences of the more advanced countries in ocean resource development, since such development is a sound basis for assessing needs of other States that are aiming to further their level of development. Experiences in a region or subregion are highly relevant to the development of methods and mechanisms for other States of the same region and, when appopriate, of other regions.

8. While the needs of States are expressed as being current, they would in many cases be ongoing and prospective needs that extend over several years. Responding to them and fulfilling those objectives would take a corresponding period of time. To that extent, the needs may be considered to be those applicable to the decade of the 1990s. There may, however, be shifts in needs and priorities and development goals, as new problems are encountered and experience demands.

9. A comprehensive review of the efficacy of measures currently undertaken to evaluate appropriate national, regional and global responses to the needs identified, and to evaluate alternative strategies, methods and mechanisms for maximizing the opportunities of States for the realization of benefits, will require carrying out an in-depth study of practical experiences and ongoing activities of a cross-section of States and of competent organizations and institutions at the national and regional levels. It would also require a review and evaluation of activities, current and prospective, at the international level by intergovernmental conferences and bodies and the programmes of international organizations with competences in marine-related activities.

10. The follow-up to the present report will also take into account its consideration by the General Assembly, as well as comments and observations of Member States, international organizations and institutions.

II. POTENTIALS AND CHALLENGES OF OCEAN RESOURCE DEVELOPMENT UNDER THE OCEAN REGIME ESTABLISHED BY THE CONVENTION

11. The régime for the oceans contained in the 1982 United Nations Convention on the Law of the Sea offers rich promise for all countries, especially the developing countries, which are increasingly turning to the ocean and its resources to fulfil their nutritional needs, to satisfy their energy requirements and to meet their demands for new or supplementary sources for raw materials. They are drawn to the potential offered by additional uses of the seas, by supplementary food sources and the other resources of vastly expanded areas of marine jurisdiction, by new marine technologies that could enhance existing activities, and by the more efficient management of the ocean sector, to eradicate malnutrition, alleviate poverty and raise the living standards of the poorest of their poor.

12. However, although the Convention confers rights under which States may explore and exploit ocean resources, these rights have not, in actual fact, been translated into tangible or substantial benefits for most. The difficulties faced by many States, especially developing States, that are yet unable to reap the benefits under the new régime, are several and varied. There is a lack of awareness of the total development potential of the marine sector, national capacity for development has been strained, and capabilities in the ocean sector are limited. Available financing and external assistance has been insufficient. In the few cases where it has been available, the level of international financing has been minimal. Other national priorities have consumed scarce financial resources and funding for enhanced activity in the ocean sector is thus virtually non-existent at present. While marine technology has advanced rapidly, the acquisition of new technologies is beyond the reach of most. For instance, several developing countries are inadequately equipped to deal with the environmental implications of marine development and other ocean uses; they cannot respond to catastrophies or threats to the ocean ecology. The development of skilled manpower in the several disciplines is yet a distant goal to many.

13. The Convention on the Law of the Sea lays emphasis on the need to promote the development of the marine scientific and technological capacity of developing States. States are encouraged in particular to promote such development with regard to the exploration, exploitation, conservation and management of marine resources, the protection and preservation of the marine environment, marine scientific research and other activities in the marine environment compatible with the Convention in order to accelerate the social and economic development of the developing States (article 266).

14. Member States, especially developing States, have repeatedly brought to the attention of the General Assembly their increasing need for information, advice and assistance, inter alia, in their developmental process for the full realization of the benefits of the comprehensive legal régime established by the Convention. The Assembly has consistently called upon the Secretary-General to continue to assist States in the implementation of the Convention and in the development of a consistent and unified approach to the legal régime thereunder, as well as in their national, subregional and regional efforts towards the full realization of the benefits therefrom, and has invited the organs and organizations of the United Nations system to co-operate and lend assistance in these endeavours.

15. The General Assembly has further recognized that the Convention encompasses all uses and resources of the sea and that all related activities within the United Nations system need to be implemented in a manner consistent with it. It has expressed deep concern for the current state of the marine environment and has been mindful of the importance of the Convention for the protection of the marine environment. The Assembly has further recognized that the protection and preservation of the marine environment will be significantly enhanced by the implementation of applicable provisions of the Convention and it has called upon Member States and other members of the international community to strengthen their co-operation in the conservation of marine living resources, including the prevention of the use of fishing methods and practices that can have an adverse impact on the conservation and management of marine living resources.

16. The urgency to realize the benefits from the ocean régime prompted Member States to launch a systematic endeavour, first, to identify what needs to be done with regard to ocean resource development; second, to examine what is currently being done; and third, to determine how the gap can be filled.

17. It is in this context that the General Assembly has called upon the Secretary-General to review and provide a report identifying the needs of States in regard to the development and management of the ocean resources. The request to the Secretary-General also called for an overview of the measures currently taken by States and competent international organizations in responding to those needs and for suggestions as to methods and mechanisms for maximizing opportunities for the early realization for all States of the benefits of the comprehensive legal régime established by the Convention, during the decade beginning in 1990.

18. There was widespread support for the initiative taken in requesting these studies, which would galvanize the human, financial and technical resources necessary for the early realization of the vast potential and enormous promise of the ocean's resources. The initiative was also intended to indicate to international organizations and specialized agencies concerned with marine affairs that they should, in accordance with their respective policies, intensify financial, technological, organizational and managerial assistance to the developing countries, in particular, in their national efforts.

III. NATIONAL OCEAN DEVELOPMENT POLICY

19. National policy formulation and decision-making in ocean resource development and management raise complex issues, cover a variety of rights and concomitant duties, span a range of governmental and international activity, involve several sectors of activity and encompass many diverse disciplines. Given these implications, the development and management of ocean resources call for a co-ordinated, centralized and highly sophisticated development response. This can only be addressed through an effectively integrated national ocean resource policy. It has been emphasized that countries, particularly coastal developing countries, need a better global knowledge of the various implications of the Convention on the Law of the Sea, regarding the maritime zones and their resources, in order to gain a better understanding of the marine dimension within their

national competence, and this would lead to the establishment of rational marine policies.

20. A significant issue that faces the global community is that, although the rights conferred under the Convention are balanced by corresponding obligations, there is a tendency to secure and exercise the rights but to relegate the fulfilment of obligations to a place of secondary importance. These obligations relate, inter alia, to the freedom of navigation, the protection and preservation of the marine environment and the conservation of living resources. There have been instances when States, in exercising their rights, have neglected the rights of third States by failing to observe them or by acting in a manner incompatible with the requirements of the Convention. There is a need for correcting this situation. There is also the need to maintain a balance between development and the environment (article 193). The opportunities for increased resource extraction and the prospects of new and beneficial uses have to recognize and respond to the hazards of environmental degradation of the seas which have caused global concern in recent years.

21. The enjoyment of rights and compliance with duties cannot be effected in a piecemeal fashion. They can only be addressed through co-ordinated and concerted action on a number of fronts. The demands for formulating an integrated marine policy and for the development of a co-ordinated response flow also from the resource development potential and its prospective contribution to national economies. While traditional uses of the seas have in many cases been restricted to fisheries and maritime transport only, technological developments have clearly shown that the future of mankind may well hinge on the vast and as yet untapped living and non-living resources of the sea. The ocean is considered to be a relatively new area of activity for the policy makers in Governments of many countries. A full awareness of the economic potential is vital for national planning and should influence the determination of development priorities. Efforts should be geared towards the expressed need to broaden the awareness of Governments, their policy makers, prospective investors, and the general public, of the resource potential of the ocean bordering them, as well as to enhance the skills of personnel for managing these areas.

22. It is therefore not surprising that, while some Governments have already taken the necessary steps to develop a national ocean policy and to establish integrated ocean management, it is still the predominant and unfulfilled need of most developing coastal States. Even some developed States that have taken early steps to organize national ocean policy have achieved only limited success. Developing countries are in a position to determine what patterns of national organization are more appropriate for the present and probable future uses of the oceans and what kinds of training would be most appropriate for officials staffing national marine policy-making establishments. Experience with advanced maritime countries would suggest several criteria that should guide developing countries. 2/

23. The many and varied activities that States have to undertake as a consequence of the new legal régime require that ocean resource development should provide a balance among the multiple uses and between environmental protection and development and should deal with the necessary trade-offs involved in establishing

national priorities. In that respect, the Convention is seen as providing a comprehensive and integrated framework for marine resource development and for the management of its uses.

24. In general, the objectives of marine resource development have been identified as follows: increasing national income; contributing to improvements in living conditions; increasing food and protein availability; providing new sources of energy; increasing raw material availability; creating employment; increasing foreign exchange availability; and introducing new technology. The need for developmental activities aimed at the achievement of these objectives, as well as the need for devising the necessary policy instruments, was uniformly expressed by States. In devising the optimal and integrated set of objectives, due regard has to be given to ensuring the freedom of navigation, conservation of living resources and the protection and preservation of the marine environment. The selection of the optimal set of integrated objectives and devising the necessary policy instruments has essentially to be addressed by the States themselves. However, some States, especially developing countries, clearly indicated that they require assistance in carrying out such a complex exercise. 3/

25. In view of the dramatically increased administrative challenge under the integrated marine resource policy approach, most States expressed the need for a more co-ordinated and cohesive institutional arrangement, moving away from the traditional dispersed approach. Traditional division of responsibilities within Governments has resulted in the allocation of competences over different aspects of ocean uses and ocean resource exploitation, often jointly with aspects of land-based activity. In many cases, there has not been a review of marine-related activity in a single integrated context. Many States seek assistance in devising appropriate institutional arrangements, based on the experience of other States that have successfully addressed the matter.

IV. INTEGRATED MANAGEMENT IMPLICATIONS

26. While planning must be systemic interlinking the multiple uses of the marine environment, it must also be functionally directed. There is also a need to rank objectives in terms of priority and to set a time horizon for each, balancing short term and long term interests and consequences. The main task of executive leadership lies in attempting to control both dimensions of the policy process, namely, decisions and implementations. Within the several sectors of marine-related activity, the management implications of an integrated ocean resource policy should take into account (a) the integration of the requirements of the Convention into national legislation; (b) securing and applying the management information and data that is relevant to the taking of management decisions; (c) development of national capabilities; and (d) satisfying environmental concerns and requirements.

A. Integration of the requirements of the Convention into national legislation

27. The comprehensive legal framework under the Convention provides the foundation for the use of the ocean and the development and management of its resources. It is fundamental to rational development and management that there should be compliance with the internationally agreed legal framework and that the laws and regulations of States should conform with the Convention. To do otherwise would result in protests and repudiations from third States that could jeopardize peaceful uses and hinder resource development. A stable legal order is a prerequisite for proper management and for securing investment and international funding to support national marine-related efforts.

28. Many States have adopted umbrella provisions to bring extended maritime zones within national jurisdiction and to secure the rights accorded to them under the Convention. However, in order to secure those rights, States must first delimit their maritime boundaries; they must adopt more detailed regulations and practices for the management and development of marine resources, and national legislation must be adapted and be harmonized with the requirements of the Convention. In order to undertake all these tasks, developing countries would need assistance. Assistance from developed countries for this purpose is available and a community of purpose is seen.

29. The establishment of a consistent set of national laws and regulations requires a comprehensive review of existing legislation and a thorough assessment of needed changes. Several States have expressed a need for assistance in their legislative endeavours. States of a region or subregion have individually and jointly expressed their need to ensure the development of a uniform and consistent legislation and practices and the furtherance of effective co-operation in the application of the provisions of the Convention.

B. Need for information and data

30. Sustainable development of resources requires comprehensive data on a variety of physical, chemical, biological and environmental parameters. The keys to exercising coastal State rights over the resources of the ocean are knowledge, understanding and technology. Ocean mapping and resource delineation are critical first steps in the successful exploration of this new frontier. The need for scientific information and technology development, whether applicable to traditional uses or to new avenues, has been widely expressed. In the area of fisheries, for example, in order to evaluate resource potentials, to adopt appropriate conservation measures and to maximize harvesting of resources, it was repeatedly pointed out that an urgent need existed for determining the maximum sustainable yields for different species, for establishing the harvesting capacity of a coastal State, for determining the available surplus and for establishing the terms and conditions of access to the available surplus. Data, information and capabilities are needed to establish such requirements as exploitation rates, conservation zones during specified periods and specification as to permitted equipment, gear and methods, as appropriate. In respect of the non-living

resources within extended jurisdictions, a need was expressed for geophysical prospecting, surveys, mapping and assessments of potential resources.

31. The obligations of coastal States to other States are also intrinsically linked to scientific information and data. For instance, coastal States are under an obligation to provide navigational aids and to establish sea lanes and traffic separation schemes for the safety of navigation and of life and property at sea. While this obligation applies to navigation through the territorial sea and straits used for international navigation, it is equally applicable to artificial islands, installations and structures in the exclusive economic zone, or on the continental shelf (articles 60 and 80). In this regard, the need for marine meteorological forecasts and warnings, information on ocean wave conditions and forecasts, as well as for modelling and early warning systems, have been expressed.

32. While legislation establishing the breadths of various maritime zones have been promulgated, in many cases, most States have yet to establish the limits of the continental shelf where it extends beyond the exclusive economic zone in accordance with article 76 of the Convention. As a result of the various technical specifications of the Convention with regard to delimitation, including that baselines and all maritime boundaries be shown on charts, or defined by a list of co-ordinates referenced to a specific geodetic datum, and that the low-water line and/or a system of straight baselines be used to establish baselines, technical assistance has been sought with regard to: (a) hydrographic data and nautical charting; (b) geophysical data relating to sediment thickness; and (c) bathymetric data.

33. In addition, assistance was sought to improve the status of hydrographic data and hydrographic services for, inter alia, seaborne trade in its relation to the safety of navigation (updated charts), protecting the coast from oil pollution (for example, oil pollution caused by tankers because of the lack of accurate charts or lack of knowledge of the currents and tidal streams), the fisheries industry, the protection and preservation of the marine environment, and the development of ports and harbours.

34. In this regard, needs were expressed in relation to a programme of assistance to upgrade hydrographic services through, inter alia, collecting or compiling necessary data and information, formulating an appropriate hydrographic programme, obtaining requisite vessel or vessel time, equipment and instrumentation, and obtaining requisite human skills.

35. It has been pointed out that most countries do not have effective hydrographic services in respect of surveying, nautical charting and the provision of notices to mariners and nautical warnings. Indeed, the need has been expressed for the provision of more hydrographic charts of the world's oceans, because current hydrographic data, which for the most part are insufficient, are based on surveys conducted about 100 years ago, and consist of leadline soundings only.

36. Needs were expressed for bathymetric data for the purposes of delimiting maritime areas. Bathymetric data resulting from the measurement of water depth is similarly important in a number of possible uses of the ocean including fisheries, geological and engineering investigations of the sea floor, as well as navigation.

37. For the development of ocean resources, more comprehensive knowledge of the potential of exclusive economic zones and continental shelves requires a detailed scientific understanding of environmental conditions, including characteristics of the air-sea interrelationship; the water column, its physical properties and its chemical and biological constituents; the water-sediment interface at the sea-floor; and the bathymetry and thickness of sediments on the continental shelf. This same base of information is important for resource management and conservation, enforcement and defence, safe navigation and operation at sea.

38. Assistance was sought by States in assessing the resources of the exclusive economic zone (both living and non-living) and in developing these resources in an environmentally sustainable manner. It was indicated that the information base required for resource management and environmental protection represented a significant need that should be addressed. It was also pointed out that the support services and information required to sustain such development, in particular, marine meteorological and oceanographic observations, as well as primary oceanographic data collection, were in many cases unavailable.

39. In summary, needs were expressed by coastal States for primary data needed to secure resource jurisdiction and for the development and management of ocean resources. Data needs were expressed along the following lines:

(a) Physical - tidal, wave, current, wind and depth data;

(b) Chemical - salinity data;

(c) Biological - stock assessment, ecological system for mangroves, coral reefs and ecosystem sensitivity;

(d) Geological - geophysical prospecting surveys, borehole drilling capability;

(e) Environmental - formulation of standards, data on level of contamination, their effects on resources and human health.

40. The management of data on marine affairs, in particular, oceanographic data, will be a critical part of a coastal State's ocean resource policy. In most countries, many different groups (international organizations, regional bodies, government agencies, academic research laboratories and the private sector) collect, use or archive many kinds of data on the exclusive economic zones (EEZ). Data of different kinds and different quantities are collected. Consistent reporting formats are not necessarily used. These problems are likely to worsen as the use of state-of-the-art technology (satellites, multibeam echosounders, etc.) produces data at faster rates. In this context, the need to upgrade the quality and coverage of data was expressed.

C. Development of national capabilities

1. Marine science and technology capabilities

41. Advancements in science and technology were an impetus to the formulation of the Convention, and the Convention in turn provides a framework for the development of science and technology capabilities in the marine field. In this context, the Convention reflects the consensus of the international community regarding the importance of marine science and technology for realizing the benefits and carrying out the responsibilities set out in the new legal régime for the ocean. 4/

42. In relation to the development and management of ocean resources, both developed and developing States emphasized that there was a need for marine science and technology capabilities; that effective scientific input to developmental activities is a prerequisite (for the management and utilization of the rich and varied natural resources available in the sea); that, in order for the developing countries to derive greater benefits from the legal régime established under the United Nations Convention on the Law of the Sea, the transfer of marine science and technology and the training of specialists are required; and that North-South and South-South co-operation, as well as other channels, must be used to promote the development of marine science and technology and the ocean industries of developing countries, and to enhance those countries' capacity to utilize and exploit the sea and its resources.

43. It is significant that both developed countries and developing countries in need of assistance in marine scientific research expressed interests in the practical application of the marine scientific research régime under the Convention. It was pointed out that, by respecting the law of the sea and applying it with a positive attitude to the needs and interests of international research, coastal States would contribute to a rational use of marine resources, based on secured scientific and technological knowledge. The need was expressed for well defined rules, regulations and procedures for the granting of permission to States to carry out marine scientific research, participation by coastal States, monitoring of marine scientific programmes, and dissemination of marine scientific research results. In the same context, the need to explore the practical benefits of co-operation between researching States and developing States in terms of sharing basic scientific work and resource-oriented work was expressed. There is a convergence of interests: while, from the point of view of developing coastal States, there should be more opportunity for the participation of scientists from developing States in research cruises undertaken by developed States, from the point of view of developed countries, participation in research cruises of national research vessels is offered.

44. Many developing coastal States expressed a need for acquiring the capability to have full awareness of what kinds of data and information may result from marine scientific research activities. The need for gainful access to such data and information was also expressed. There is also a related need to interpret and communicate results of scientific research in the context of resource development.

45. Science and technology infrastructures are necessary so that national marine scientific and technological efforts may be successfully undertaken. There is a need for "strengthening of marine science infrastructure, including training of management to ensure that the scientific (and technological) community is able to contribute effectively to the formulation and execution of policies relating to marine development. Strengthening of this infrastructure would include establishment of appropriate relations with other national bodies concerned with science policy, scientific research, science services, marine affairs, higher education, public information and development/acquisition of technology". It was also added that there was a need for the "development of a mechanism for co-ordination and stimulation of marine science internally and to interface with other national agencies and institutions as well as with international organizations". The need for national laboratories and institutes was also expressed in this context.

46. With respect to marine technology, in view of the rapid advances in the technologies for exploration and exploitation of marine resources, the basic need, as expressed by many States, is to be kept abreast of the developments, and to be assisted in the assessment and utilization of technological advances in various marine sectors. Emphasis was placed on the assessment of technologies and on the identification of appropriate technologies in terms of their impact on the marine environment.

47. The scientific and technological requirements for the development and management of marine resources and uses are referred to in section V below. In the present section mention is made of the areas spanning intersectoral aspects, as identified specifically by States. These areas include marine scientific research on the effects of estuarine and continental shelf deposits, ocean-atmosphere interaction, ecological systems of mangroves and coral reefs and their productivity; marine electronics; application of computer science; environmental protection technology; ocean engineering, especially in relation to structures, materials, instrumentation, submersibles and propulsion systems, marine technology related to instrumentation, diving systems, and position fixing; and coastal marine resources.

48. The need for international co-operation with respect to marine science and technology has been emphasized consistently by developing as well as developed States. The Convention highlights the need for co-operation in marine scientific research and the development and transfer of marine technology, not only among States but also among States and international organizations. Keeping in view a number of advantages of co-operation in marine affairs at the regional level, the Convention promotes the establishment and strengthening of regional marine scientific and technological research centres (articles 276 and 277). The need for the planning and preparing for the establishment of such regional centres was pointed out in the report of the Secretary-General to the General Assembly at its forty-fourth session (A/44/650, para. 174). The need for international co-operation in marine scientific research cruises, research programmes and technology acquisition have been emphasized, while international co-operation in the form of national inputs and national participation in the programmes and projects of international organizations has also been highlighted. The need for

international expeditions for the purpose of marine scientific research has been expressed. With respect to marine technology, the co-operation between the suppliers of technology and users of technology is considered to be necessary.

2. Human resources development

49. The need for human resources, with expertise in the requisite fields, for the development and management of ocean resources has been pointed out by States in relation to specific areas, for example, marine science and technology, exploitation and conservation of living resources, exploration and exploitation of non-living resources, maritime transportation, etc.; the present report reflects these human resources needs under the corresponding sections. In this section, certain general issues of human resources development are addressed, based on the needs expressed by States.

50. It was pointed out that the education and training systems in most coastal countries lack a marine orientation, although the coasts and the oceans play a significant role in their society and economy; consequently, there is a need to introduce such an orientation through the expansion of the curricula of the secondary and tertiary educational institutions to include marine sciences and marine-related disciplines.

51. Human resources needs were identified at three different levels: (a) managerial level for the formulation and implementation of ocean resource policy; (b) engineering level for the acquisition and development of marine technologies; and (c) technical level for the operation of marine technologies.

52. Special emphasis has been placed on managerial personnel capable of performing the tasks related to ocean resource policy and management, fisheries management, science and technology policy, etc. It has been pointed out that the policy and management personnel need to be knowledgeable, not only in the marine disciplines, but also in other fields, such as law of the sea, economics, sociology and political science; they also need to be familiar with policy-making, planning and management techniques, including the utilization of management information and application of systems analysis.

53. A need was expressed for the selection of an optimal mix of various types of training in view of the relative costs and benefits involved: short-term training, attachment training, on-the-job training, long-term education, etc. 5/ For example, long-term marine education is provided as a total system in academic institutions, commencing at the post-secondary levels and including collegiate or university degrees. Under this arrangement, practical training is offered as a supplement which provides for sea-going experience in training vessels. The alternative system of on-the-job-training involves at-sea training with periods of academic learning. The first system has the benefits of a more in-depth and broader education. The numbers that can be accommodated would, however, be limited to the accommodation capabilities of the institutions. The second alternative is more flexible and provides for a faster turnover of the number of trainees in a shorter period of time, albeit with less comprehensive specialization.

54. The specific areas for which training needs have been expressed by States are mentioned in various sections. This section includes the needs of States in cross-sectoral areas. One important area in which training needs have been identified is the development and enforcement of pertinent national legislation, regulations and rules, as well as negotiation and formulation of international agreements at the bilateral, regional and global levels. This need arises particularly from the requirements of implementing the often complex and specialized provisions of the Convention on the Law of the Sea.

55. Other identified areas of training needs include off-shore oil and non-fuel mineral research, including marine geophysics and engineering geology; meteorological and oceanographic services; environmental management, including techniques and methods of combating oil pollution and setting environmental quality standards; telecommunications; remote-sensing applications and data interpretation.

56. While, on the one hand, the needs for training and education in the development of human resources were expressed by many developing States, on the other hand, developed States identified training opportunities available in their countries.

3. Financial resource needs

57. The concern that the developing countries are as yet unable to take effective measures for the full realization of the benefits of the comprehensive legal régime established by the Convention, owing to the lack of resources, has been expressed by the General Assembly itself. The fact that, for the development and management of ocean resources, individual developing countries are hampered by a lack of finance, and have therefore almost entirely depended on external assistance, which has, however, been insufficient, has been emphasized pointedly. For the purpose of the development and management of ocean resources, financial resources must be mobilized.

58. The usual need for finances for development takes on certain unique dimensions in the case of the development and management of ocean resources. It is to be noted that most of the expressed needs of States address the issue of the mobilization of finances for marine projects, in view of these unique dimensions of marine development.

Attracting investment to marine projects: appropriate inducements

59. To begin with, in spite of tremendous technological advances with regard to marine resource exploitation, the "investment opportunity set" considered by most investors and financiers, private or public, domestic or foreign, does not encompass marine-related projects beyond the traditional sectors or fishing, shipping and in the last few decades, offshore hydrocarbons. This lack of awareness of investors towards marine projects is present both in developed and developing countries, although in the latter case, in a more pronounced form. In this context, there is a need to devise appropriate investment promotion measures which would facilitate breaking down the barriers to marine orientation.

60. It has been pointed out that a transition needs to be made from a scientifically established resource occurrence to a commercially viable "bankable" resource exploitation project. In this context, it was pointed out that the connection between scientific effort and economic exploitation is so distant that support may be needed to facilitate the operation of market forces.

61. Most marine development efforts that would provide a significant rate of return would require some inducement. Such inducement may be in the form of accomplishing further scientific research, data-collection activities, research and development on technology, pre-feasibility and feasibility related studies, or market studies. However, these activities have substantial cost implications, and either private or public financial resources need to be committed for these purposes.

62. The marine sector provides examples where the opportunities for social development and economic benefits, as viewed by the Governments, are quite high. However, they may not necessarily attract private investment. This means that in many cases the social rate of return from ocean resource exploitation is considered to be high, but the private rate of return is not attractive. The need to devise appropriate policy instruments facilitating the alignment of social and private rates of return was expressed.

63. The need for finances for the development and management of ocean resources has been expressed in most cases in terms of funds for the pre-investment activities described above. The sources of such finances can be (a) domestic public funds, (b) external funds, including technical assistance, from donor countries, and (c) external funds, including technical assistance, from international donor agencies. A need exists to explore the [illegible] of sources. In view of the fact that the level of funding [illegible] substantially less than that needed for investment, and that [illegible] in pre-investment activities would allow economies of scale, the need was expressed for the establishment of a regional trust fund, which would be utilized to accomplish the pre-investment activities and would act as a catalyst to attract investment.

Attracting foreign investment

64. In addition to attracting domestic private capital to marine projects and mobilizing and channelling public funds pursuant to the ocean resource policy, many States expressed the need to attract private foreign investment, and the need to address government policy in that direction. The need for a stable and unambiguous resource régime for this purpose has been expressed both by developing and by developed countries. 7/

65. Joint arrangements with foreign entities, whether private or public, with regard to marine resource projects, are viable sources of capital, recurrent revenues, and re-investment funds for additional marine projects. In certain cases, the rates of return from exploitation of resources are so attractive that foreign private funds could be mobilized to accomplish the pre-investment work referred to in the previous paragraphs. In offshore hydrocarbon, for example, a variety of innovative arrangements have been made between developing countries and

66. International organizations at the subregional, regional and global levels have a significant role in promoting co-operation in mobilizing finances for offshore living and non-living resource exploration and exploitation. Recently, there have been increased efforts by global and regional organizations in assisting developing States in negotiating resource exploitation arrangements and in formulating optimal revenue-generating systems. There still exists a need for further research and additional assistance in these fields. This need has been addressed by both developing States with exploitable resources in their exclusive economic zones and developed States having interest in accessing these resources.

67. Many States expressed the need to explore the possibilities of external support for national ocean resource development and management efforts, through direct bilateral or multilateral funding, including United Nations system funding agencies, and through technical assistance.

D. Environmental requirements

68. The new ocean régime provides a legal framework for the prevention, reduction and control of pollution of the seas on a global, regional and local basis. Any obligations assumed by States under special conventions and agreements related to

including the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), to ensure consistency with the Convention.

69. The view was expressed that, with regard to the development and management of ocean resources during the present decade, high priority must be given to the question of the protection and preservation of the marine environment, and that existing global and regional arrangements must be relied upon in order to control and minimize pollution of the marine environment. It was also pointed out that, given the unitary nature and mobility of the ocean, marine environmental protection based on the efforts of individual countries is inadequate, and that joint efforts involving all countries of the world and extensive global co-operation are required. To this end, the need for all countries to become parties to special conventions and agreements related to the protection and preservation of the marine environment was indicated. 8/

70. The main responsibility for the protection and preservation of the marine environment lies with the States which enjoy the benefits of being granted sovereign rights over living and non-living resources within the limits of an exclusive economic zone and on the continental shelf (articles 56, 193 and 208). In this context, coastal States have a duty not to transfer damage or hazards, to

and-based sources of pollution, to
and to minimize to the fullest extent
94-195, 207, 208 and 211). A product of
conferred on port States which may even
discharge beyond their jurisdiction,
against any vessel which is voluntarily within a port or at an offshore terminal of the port State (article 218).

71. It was pointed out that the two tasks facing many States were (a) to prevent harm to the marine environment arising from activities of the coastal State; and (b) to exercise the coastal State's ability to resist pollution threats from other States.

72. Technical assistance was sought to determine the origin, distribution, entry route and volume at entry of the major pollutants of coastal waters and lagoons to obtain a basic grasp of the scope, levels and trends of pollution. The need for further research on the effects of marine pollution on human health and aquatic resources was addressed. The necessity for instituting control projects or operations at the source of pollution was also pointed out.

73. Technical assistance was sought to formulate and implement marine environmental protection standards including ocean water quality standards, fishery water quality standards, atmospheric quality standards, standards for the disposal of industrial waste and standards for the disposal of oil-bearing waste water. It was pointed out that there was a need to train engineers and technical staff conversant with new analytical techniques, and to equip water analysis laboratories

prepared to identify site specific problems prior to the commencement of mining operations, and for the purpose of monitoring such impacts during actual mining operations. A need for such impact assessment was expressed.

75. Technical assistance was sought for the establishment of priorities and in the formulation of contingency plans in the event of oil spills. Assistance was also sought for the acquisition of the infrastructure and equipment to combat oil spills and to implement contingency plans. Requests were made for the modernization of ports and for specialized training in combating oil pollution.

76. In respect of dumping, a need was expressed for information on the transport and warehousing of the various kinds of dangerous wastes and noxious substances. Protection was sought against the dumping of toxic substances and requests were made for expertise to regulate the storage and destruction of toxic wastes.

77. It was pointed out that climate change is arguably the most important international environmental issue faced by the world community. It was noted that the ocean and atmosphere together formed a fluid dynamic envelope that is not well understood. It was suggested that any possibility of predicting the evolution of climate demanded that ocean behaviour be taken into account. The need for a comprehensive global ocean observing system to monitor changes in the ocean and

thus to determine its effect on the atmosphere and the global climate was expressed. In this regard, the need for international co-operation in the collection and exchange of both satellite data and data obtained by such means as ships, buoys and tide gauges was indicated.

E. Surveillance and enforcement

78. Surveillance and enforcement as the means by which States would secure compliance with their national marine regulations adopted in accordance with the Convention, extends over wide-ranging activities, whether on their land territories, within their national maritime zones and beyond, on vessels traversing through their waters, on artificial islands and structures and even in the air. Surveillance and enforcement activities would especially have to cover the totality of maritime areas adjacent to the coast for numerous purposes as an essential requirement for effective development and management of ocean resources.

Navigation

79. Surveillance would be required to ensure compliance with coastal State regulations for safety of navigation, such as utilization of designated sea lanes and traffic separation schemes, protection of navigational aids and facilities, cables and pipelines, conservation of living resources, preservation of the environment, conduct of scientific research and survey, prevention of infringement of customs, fiscal, immigration and sanitary laws, and implementation of special measures that regulate nuclear-powered vessels or those carrying [illegible] or noxious substances. Surveillance would also be called for [illegible] illicit drug trafficking and to exercise civil jurisdiction [illegible] incurred or assumed during a voyage through coastal [illegible] and 28). Such needs would involve information-gathering and data collection, and would utilize several technologies which include remote-sensing, pollution-monitoring, monitoring of passage, etc.

Living resources

80. The conservation, management and utilization of living resources in exclusive economic zones requires a high level of active surveillance in dealing with the regulation of national fisheries in the zones. The enforcement implications regarding living resources exploitation would call for a wide range of administrative and law enforcement activities which include boarding of vessels, their detention, inspection of gear and catch, the arrest of crews, and would culminate in the institution of legal proceedings or administrative action and the imposition of appropriate sanctions.

81. The issues of "poaching", illegal access to the living resources of the exclusive economic zones, and over-exploitation have been raised by many States, and the consequent needs for surveillance and law enforcement have been expressed. Such needs cover those for coast guard capability and air surveillance as well as for co-operative arrangements.

Pollution prevention

82. Surveillance with respect to the protection and preservation of the marine environment involves monitoring activities nationally, where land-based pollution may be discharged into the oceans, in order to prevent accidents and to deal with emergencies. In addition, there is a need to monitor rare or fragile ecosystems and the habitat of depleted, threatened or endangered species (article 194).

83. Surveillance is also needed with respect to activities in the marine environment to determine whether they are likely to cause pollution or have the potential to do so. Such surveillance would be in the context of the national regulatory framework relating to land-based sources of pollution, pollution from sea-bed activities and installations, from the loading of wastes from within the territory or at offshore terminals, from vessels traversing areas within national jurisdiction, or as a result of dumping, or from atmospheric sources (articles 60, 80, 213-216, 220 and 222).

84. The prevention of pollution and damage to the marine environment, whether from land-based sources, through the atmosphere, from vessels, or from marine developmental activities, requires a highly sophisticated and an intensive level of active surveillance, both in dealing with the regulation of national activities in the vastly extended economic zone, and international activity in these zones. The surveillance needs would extend beyond these areas and into the high seas to deal with the pollution, the effect of which would be felt within the economic zone or on coastal environments. The enforcement implications regarding protection and preservation of the marine environment would call for a wide range of administrative and law enforcement activities.

Piracy and illegal broadcasting

85. The surveillance needs with respect to piracy and illicit broadcasting would be of a different nature to surveillance for other purposes referred to above. However, the enforcement implications would extend to hot pursuit and the right of visit of vessels, the arrest of persons and the seizure of property on board in the case of piracy, and the seizure of broadcasting equipment (articles 105, 109 and 110).

V. DEVELOPMENT OF OCEAN RESOURCES AND USES

A. Living resources

86. With respect to the living resources of the ocean, the new régime established by the Convention incorporates significant developments in two major areas: jurisdictional extensions and conservation and management obligations.

87. The intricate balance between rights and obligations make for complex relationships between exploitation, optimum utilization and conservation. The needs of States are thus concentrated predominantly on those for effective fishery management, in the national context, and equally importantly, because of the very nature of the marine fisheries, in an international co-operative framework, mainly at the regional level.

88. This presupposes the adoption of a sound and comprehensive national legal and regulatory framework. The legal needs of States in the area of living resources have shifted in emphasis from the preparation of legislation giving effect to the fisheries provisions of the Convention, to taking into account the experiences gained in the last decade, as well as updating regulations to make them more effective in a number of areas, especially management measures, procedures to facilitate surveillance and enforcement.

89. The needs of States for fishery management have been expressed in terms of a number of elements or factors which form integral parts of the management framework. These can be summarized as follows: (a) stock assessment; (b) increasing national harvest capacities; (c) increasing national benefits from the various sectors of the fishing industry; (d) conservation measures; (e) granting access to other States; (f) management institutions; (g) managerial and other relevant skills; (h) research; (i) technology and equipment; (j) infrastructure facilities; and (k) fiscal and financial aspects. 9/

90. In order to manage and conserve the living resources of the exclusive economic zone, these resources must first be assessed by species, with regard to the current populations of harvested species and the levels which can produce the maximum sustainable yield. Stock assessment is a prerequisite for the determination of total allowable catch, national harvest capacity and the surplus of allowable catch. Thus, one of the most significant needs for the 1990s is improving data for the stock assessment and monitoring purposes and the preparation of resource inventories for national and regional management.

91. The needs with regard to increasing national harvest capacities, as expressed by States and intergovernmental bodies, are similar to the familar ones related to the development and exploitation of the resources of a State by the State itself or its nationals, with unique characteristics arising out of the post-Convention world ocean régime. First of all, many States were not equipped to develop the newly acquired resources, and as FAO points out, "the developing coastal States, particularly those bordering West Africa, lacking the human, physical and financial resources required to exploit the resources newly under their jurisdiction, have entered into fishing agreements not only as a means of acquiring foreign exchange through licensing or access fees but also the skills and experience needed to develop their own fisheries".

92. Secondly, in most developing countries, existing fisheries activities are predominantly of an artisanal nature. With expanded resources, there is a need to evaluate whether and to what extent artisanal fishery can be expanded to increase harvest, a related need to assess whether and to what extent industrial fishery can be developed, and a concomitant need to examine whether any conflict may arise between the existing artisanal fisheries and the emerging industrial fisheries. If such conflicts do arise and in case there are socio-economic dislocations of traditional artisanal fishing communities, appropriate measures need to be taken to resolve such conflicts and to minimize the adverse effects of dislocations. 9/

93. Increasing national benefits from various sectors of the fishing industry involve (a) the need to tackle the problem of wastage and post harvest losses so as to make more effective use of existing catches; (b) the need to increase the share

of developing countries in the rapidly expanding international trade in fish and fishery products; (c) the need to seek the means to exploit and bring economically to market species so far neglected; and (d) the need for a co-ordinated regional effort to gain access to export markets. In the context of the latter need, the availability of timely, comprehensive market and pricing information is essential; the knowledge of the market for processed fish and of the processing standards is also essential for this purpose. 9/

94. The Convention provisions with regard to the optimum utilization of the living resources of the ocean (both within the exclusive economic zone and in the high seas) subject to the conservation obligations, were addressed by almost all the States, developing and developed alike. With respect to conservation, the need was expressed for (a) regulatory measures; (b) surveillance of maritime zones and enforcement of regulatory measures; and (c) international co-operation at the bilateral, subregional, regional and global levels.

95. It was pointed out by many States that regulatory measures need to address a number of issues, such as: specification of harvestable species; specification of protected species; prohibition of exploitation of threatened and endangered species; rate of exploitation of harvestable species; optimal age of harvestable species; demarcation of protected zones and zones where fishing is suspended; prohibition of fishing in specified zones during specified periods; and prohibition of certain specified fishing equipment and methods.

96. The need for compliance with conservation measures and for co-operation among coastal States and fishing entities cannot be over-emphasized. Due to the very nature of the problem, the need for international co-operation with regard to shared stocks, straddling stocks, highly migratory species, anadromous species and catadromous species is much more pronounced, both in the exclusive economic zone of a coastal State and particularly in the high seas.

97. The most important needs with respect to granting access to the surplus of total allowable catch relate to the formulation and implementation of improved terms and conditions of fishing agreements, and it is significant to note that such needs were expressed by both coastal States which grant access and foreign fishing interests to whom access is granted. The interests of coastal States involved increased revenues, acquisition of resource exploitation capabilities, and conservation; at the same time, foreign fishing fleets expressed concerns about the activities of competing fleets, such as over-exploitation, illegal open access or poaching. Thus, the need arises for improved terms and conditions with regard to revenue generation and conservation, as well as for effective measures to ensure compliance with the terms and conditions.

98. Many developing States expressed the need to develop national capabilities to pursue access negotiations. A need was also felt to assess costs and benefits of according preferential access to members of regional, economic or interest groups. In addition to the usual revenue-generating charges, such as access fees, licensing fees, taxes, etc., many developing States have expressed the need to explore the possibilities of joint ventures. On the other hand, long-distance fishing States expressed interest in entering into agreements with coastal States.

99. In relation to the above areas, there has been an increased requirement for specialist legal assistance in the area of negotiating fishing agreements, not only at the bilateral level, but also at the subregional and regional level. The increased involvement of States in the preparation of agreements at the subregional and regional level has been particularly marked in West Africa, where the Subregional Commission on Fisheries has been promoting subregional co-operation in a number of areas in fisheries, in particular, harmonization of access while work is under way in respect of a regional convention of fisheries co-operation for West Africa. Similar needs are apparent in the Caribbean region, where CARICOM has commenced work on a draft convention on harmonized conditions of access.

100. The need for the appropriate fishery management institution was expressed in the context of treating marine fishery as a distinct industry in terms of economic organization, technology, etc., but at the same time as an integral part of the national food and nutrition strategy, and in a broader sense, of the national development strategy. In many countries, marine fisheries are dealt with by the Ministry of Agriculture which may lack the fishery orientation. A need thus arises for the appropriate institution, not necessarily a separate entity, which would manage "fisheries" in the "marine" context.

101. A need was expressed for a qualified cadre of fisheries experts particularly equipped with managerial skills to formulate and implement the fisheries management programme. The managerial needs would involve not only expertise in marine biology but a more multidisciplinary approach to planning national fisheries development, including social and environmental considerations.

102. The need for marine scientific research, including research related to marine living resources, has been addressed in another section of the paper. In this section, mention is made of the need for fishery research as specifically expressed by States. The specific areas of research include reinforcement of depleted stocks; effects of pollution on marine living resources and measures to combat such effects; modeling and forecasting the extent of fish stocks; fish migration patterns; modeling of large marine ecosystems addressing issues of reproduction, growth and feeding strategies of marine populations.

103. States and international organizations mentioned certain specific needs in relation to the exploitation of living resources, e.g., deep-water fishing technology and fishing vessels; industrial fishing technology and vessels; fibreglass fishing boats and motorboats for artisanal fishery; and mariculture technology.

104. The specific needs for infrastructure facilities related to living resources, as expressed by States, include expansion of port facilities for expanded artisanal fisheries; port and harbour facilities for industrial fisheries; improved weather services for fishermen; and expeditious administrative mechanisms for permits and licences related to fishing.

105. Specific fiscal and financial needs related to the living resource exploitation include improved credit facilities for artisanal fishermen; credit arrangements in the form of co-operative ventures for the purpose of pooling the catches of artisanal fishermen and co-operative marketing of catches to obtain better terms; government financing for market research and promotion of

non-traditional fisheries; fiscal and financial incentives to artisanal and industrial fishermen to diversify into non-traditional fisheries; similar incentives to expand fish-processing and canning industry, etc.

B. Non-living resources

106. Technical assistance was sought for the development of the expertise and the technology needed to exploit marine non-living resources in areas within and beyond the limits of national jurisdiction. Specifically, several States expressed the need for resource inventories, geological and geophysical data on the continental shelf, prospecting and exploration, drilling of boreholes, assistance in the formulation of regulations and legislation governing all phases of offshore minerals, assistance in developing marine minerals, hydrocarbons and natural gas, elaboration on the rights and duties of coastal States and foreign investors, co-ordination with neighbouring States in developing petroleum resources that overlap maritime zones, and management support for information and human resource development.

107. With regard to resources within extended jurisdiction, it was pointed out that the development of multi-beam sonars, swath-mapping and remote-sensing technologies, electronic charts, geo-referenced information systems, and remotely operated underwater vehicles all contributed to an enhanced knowledge of offshore areas.

108. Technical assistance was sought to interpret the results of experimental projects in the exploration and exploitation of sea-bed resources. Requests were made for scholarships to train the highly qualified personnel needed for the exploration and exploitation of sea-bed minerals. In this regard, the need for qualified persons in marine electronics was raised. Assistance was sought in the procurement of modern instruments for ocean exploration and the training of suitably qualified persons in the maintenance and repair of such equipment.

109. The need for international organizations to meet the equipment needs of developing States through their country programmes was expressed. The view was also expressed that an international expedition, similar to the Indian Ocean Expedition of the 1960s should be organized exclusively for developing States. The need for a regional programme on sea-floor mapping using ships equipped with Gloria digital sonar equipment; and training in marine geophysics and engineering geology in coastal and nearshore waters was pointed out.

110. Financial and technical assistance has been sought to explore for, exploit and transport offshore hydrocarbon resources, to support attempts to establish the petroleum potential of exclusive economic zones by a synthesis of previous surveys, including additional seismic profiles, and to create a legal and taxation setting suited to the conditions encountered in various countries. A need was expressed for processes information and predictions, in particular, data on ocean state conditions, including extremes of ocean currents, meteorological conditions and storm surges, to facilitate offshore work on platforms.

111. Heightened activity in resource exploitation in the last decade had been directed at new ocean resources, such as oil and gas from the continental shelf, the potential mining of polymetallic nodules and sulphides from the deep ocean, and the possible extraction of beach sand deposits containing heavy minerals from the shallow sea-bed. These and new energy sources are also viewed by many developing countries as being the direction in which they should proceed to supplement traditional ocean resources, namely, fisheries. The direct extraction of energy from thermal and salinity gradients and from currents, ocean winds, and waves is already within reach. 10/ This offers the prospect of non-depletable energy sources, but they require advanced research, technology and engineering development for their applications. The prospects of such contributions to energy needs are attractive. Developing countries, particularly those more advanced in technology and those that have the financial resources to invest in the requisite research and development, and the skills, have expressed an interest also in the production of chemicals from sea water, desalination, and the production of energy from water, waves, currents and winds. Countries that are dependent on imported energy and vulnerable to non-renewable energy sources look upon the oceans as a vast reservoir of potential energy. They are following with interest experiments being made to set up commercial sea wave power with technical assistance from the industrialized world. 11/ If such experiments are successful and viable from a technical and economic point of view, other countries are likely to follow suit.

112. Many countries need salt and salt by-products and have benefited from international assistance or seek such assistance for this purpose.

C. Maritime transport and ports

113. The traditional uses of the seas as a means of communication and maritime transport are regulated under the Convention and specific provision is made for safety of navigation, navigational aids, traffic separation schemes, designation of sea lanes, etc. Many of these relate to matters of a technical nature, the implementation of which requires assistance from experts and competent technical agencies and bodies.

114. The management needs of maritime transport includes: (a) development or expansion of shipping and port services needs in the context of national development planning; (b) port and harbour development and management; (c) safe, efficient and economical conduct of marine transportation; (d) management institutions; (e) human resources; (f) financial resources; and (g) management information system. 12/

115. In developing or expanding shipping and related port services, the need for planning and investment taking place within the national, and possibly subregional or regional, development process has been emphasized.

116. A need for an assessment has been expressed as to whether the shipping services are to be provided nationally, by joint venture or by foreign flag operators. In this context, the need was expressed to study the feasibility of subregional or regional shipping lines which would meet the pooled requirements of

the countries in the subregion or the region, the requirements of individual countries being too limited to sustain a whole shipping line.

117. Port development planning, even on a small scale for local projects, needs to take place in the wider context of national development planning. The wide-ranging impacts that port facilities and related developments can have in improving development opportunities including marine resource development and trading patterns have been recognized by many States. Conversely, the likely adverse impacts of the absence of adequate port facilities on the standard of living of the country nationals or of a community have also been recognized by many States.

118. With regard to port development, a need has been expressed for a comparative assessment of the costs and benefits of joint use ports for both commercial shipping and fishing vessels, and separate consideration of port facilities for commercial transportation and for fishing vessels. This need for assessment arises from the possible economies of scales, on the one hand, and, on the other, the fact that the ship characteristics involved and the port infrastructure requirements are sufficiently different to warrant separate facilities.

119. A number of requirements have been identified in order to ensure the safe, efficient and economical conduct of marine transportation. Many of these requirements are specified in the Convention itself:

(a) Regulations and standards with respect to construction and equipment of ships as well as operating practice exist in the form of conventions of IMO. These conventions were developed to achieve efficient operation, ensure safety, protect the ship and safeguard the port installations from accidental damage, and to minimize the risks to marine environment. However, the conventions themselves in certain cases permit development by national Governments of standards, particularly with respect to smaller vessels. The evolution of the shipping industry and new international obligations require the revision and updating of the Merchant Marine Code, in many cases. Developing States expressed the need for assistance in such exercises.

(b) The application of the regulations and standards requires trained officials and staff in port administration, as well as trained officers and crew on board ships. IMO in collaboration with UNDP provides advisory services and consultancy to developing States in this regard. The need to reinforce further these assistance services was expressed. The capability of surveying and certifying ships needs to lie with coastal State Governments. This gives rise to a collateral need for uniform training and certification of responsible officials and their ratings.

(c) Both shipboard systems and external navigational support systems are required for safe navigation. Visual and electronic aids to navigation are required for safe all-weather navigation in the vicinity of coastlines and isolated navigational hazards and in restricted waterways and port areas. 12/ There are internationally recognized standards for navigational aids. However, in many developing countries, there is a need for obtaining the requisite visual and electronic aids and for acquiring the capability to operate and maintain them.

(d) The growth in traffic density, ship size and speed and particularly the hazardous cargoes in bulk in many parts of the world has highlighted the need for elaborate ship routing measures. The Convention imposes the obligation on coastal States, States bordering international straits and archipelagic States of the designation of sea lanes and prescription of traffic separation schemes in the respective bodies of waters under their jurisdiction, and a corresponding obligation on other States to use such lanes and schemes. Although internationally acceptable standards and procedures for these purposes exist, for many developing countries the tasks involved require scarce managerial and technical inputs, and therefore, a need for assistance in this matter arises. There is also a need to maintain and give due publicity to charts of the areas concerned to satisfy the requirements of deep draft ships.

(e) Warning systems are in place and in operation in most States. However, some States expressed the need for assistance with respect to considerable requirements for data reception, skilled manpower for radio communications, and equipment. There was also a need expressed to assess the relative costs and benefits of various options of radio communications, e.g., ship-shore-ship, ship-ship, etc.

(f) The Convention imposes certain obligations on coastal States and other States with respect to search and rescue operations (art. 98). International arrangements for search and rescue are in force and, in many cases, bilateral agreements or arrangements prevail. But a need arises for many States to have the capability to execute the agreements or arrangements, to have the necessary vessel and equipment, and the skilled manpower. There have been significant technological progress in global maritime distress communications systems through the use of satellite communications. This raises the need in the case of many developing countries for obtaining the requisite capability to operate the systems, and also the necessary equipment and skills.

120. Marine transport activities and ports operation call for a co-ordinated institutional arrangement. Separate government agencies dealing with shipping and port management are quite common. Some States pointed out the danger of a lack of co-ordination among these separate agencies and highlighted the need for a co-ordinated institutional arrangement.

121. Some of the needs for specialized skills have been mentioned above. The need for management skills themselves has been highlighted by many States. Scholarships to World Maritime University are awarded; however, the need has been expressed to expand the scholarship programme and to reinforce training programmes for management personnel. The interest of States in the training of maritime personnel varies considerably. Many States see their requirements in terms of manning and operating ships in their own trades and under their own flag or in a consortium arrangement. On the other hand, some States assess their requirements from the point of view of being suppliers or potential suppliers of semi-skilled or skilled personnel for service in ships of other countries.

122. Most developing countries are not in a position to develop a shipping industry on their own. However, consortium arrangements and revenue-generation from flag

ship arrangements are quite common. Some developing countries expressed the need to review such arrangements and study the possibilities of improved terms and conditions. Many States expressed the need for obtaining vessels and equipment for special purposes (marine scientific research, surveillance, etc.) or the funding for such vessel and equipment. There is also a need to improve terms and conditions of the financial remuneration of personnel supplied to ships of other countries.

123. The need for management information support and for maritime data base has been highlighted. Such information necessary for marine transportation and port development covers a wide range, from coastal characteristics, bathymetry, hydrography and physical oceanography, to international trade requirements and changing patterns of trade.

D. Recreational uses

124. The seas and beaches provide important recreational uses that can contribute significantly to the economies of many countries. The usual recreational activities have spawned a number of additional recreational uses, such as sport-fishing, boating, water-skiing and scuba-diving. A number of sea resorts, beach camping facilities, boat ramps, chalets, etc., have been built for entertainment. The development of expansion of recreational uses and the tourism sector is under way in many countries; however, the impact of recreational activities and construction, as well as the various solid and liquid waste discharges resulting from these facilities on the marine biota, are yet to be, and need to be, studied in many developing countries.

125. The impact of tourism and recreational uses on coastal environment are being studied since the greatest threat to conservation is the human effect - direct or indirect. Programmes have been implemented to monitor the impact of proclaiming small marine reserves along intensively utilized stretches of coastline. Users included anglers and bait-gatherers, in addition to a greater proportion of visitors engaged in non-exploitative recreational activities concentrated on sandy beaches. Among the many reasons for conservation is the need to provide protected or buffer areas for exploited species, thereby maintaining the natural populations for educational and scientific purposes on the one hand, as well as for recreational purposes on the other. Steps are being taken to assess threats to ecosystems in reserves, including visitor pressure, impact of exploitative uses, as well as the lack of effective management policies. 13/

VI. INTERNATIONAL CO-OPERATION

126. The Convention itself in its various parts accords international co-operation the highest importance and envisages such co-operation by establishing "a legal order for the seas and oceans which will facilitate international communication, and will promote the peaceful uses of the seas and oceans, the equitable and efficient utilization of their resources, the conservation of their living resources, and the study, protection and preservation of the marine environment" (preamble, para. 4).

127. States are required to co-operate in the management of the oceans and the uses of its resources at subregional, regional and global levels. The need for such co-operation has been highlighted under the various sections of the present report. Attention, however, is drawn to the particular need for co-operation in the field of conservation and management of marine living resources, marine science and technology and the protection and preservation of the marine environment. International co-operation is also a most effective means for the development of national capabilities of States. Attempts are being made to establish such co-operation or to augment the existing level of co-operation in a number of subregions or regions. There is thus a continuing need to provide assistance and advice to States to strengthen their efforts in this respect. Examples of such recent efforts towards co-operation may be seen in the efforts made among States members of the Zone of Peace and Co-operation of the South Atlantic, the States of the Indian Ocean Marine Affairs Co-operation, and those of the Ministerial Conference on Fisheries Co-operation among African States bordering the Atlantic Ocean, and the South Pacific Forum Fisheries Agency, among others. Other examples are to be seen in the regional fisheries bodies established under the auspices of FAO and the regional seas programmes under the sponsorship of the United Nations Environment Programme.

Notes

1/ Official Records of the Third United Nations Conference on the Law of the Sea, vol. XVII (United Nations publication, Sales No. E.84.V.3), document A/CONF.62/122.

2/ Edward L. Miles, "Concepts, approaches and applications in sea-use planning and management", Ocean Development and International Law, vol. 20, 1989.

3/ Commonwealth Secretariat, Ocean Management: A Regional Perspective, Commonwealth Secretariat, London, 1984. Report by a Commonwealth Group of Experts on Maritime Issues reflecting the challenges facing Governments of Commonwealth countries of Asia and the Pacific.

4/ See parts XIII and XIV of the Convention (see note 1, above). See also Final Act of the Third United Nations Conference on the Law of the Sea (A/CONF.62/121), annex VI. Official Records of the Third United Nations Conference on the Law of the Sea, vol. 17 (1984), p. 149.

5/ Commonwealth Secretariat, Ocean Management, op. cit.

6/ Ibid.

7/ Some developing countries have adopted legislative measures to encourage foreign investments; for example, "Offshore Hydrocarbon Act" by China, "Marine Mineral Act" by India, and the "Fishery Management Acts" of a number of countries fall under this category. Costa Rica has an innovative régime which involves four stages: surveying of the coastal and offshore areas, planning for the allocation of concessions, granting concessions for private exploitation with the payment of "rent", and monitoring and surveillance of the concession contracts.

Notes (continued)

8/ These conventions included: the 1973 International Convention for the Prevention of Pollution from Ships, as revised by the 1978 Protocol; the 1972 Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft; the 1969 International Convention on Civil Liability for Oil Pollution Damage; the 1969 International Convention relating to Intervention on the High Seas in cases of oil pollution casualties; and the 1973 Protocol relating to Intervention on the High Seas in cases of marine pollution by substances other than oil.

9/ Commonwealth Secretariat, Ocean Management, op. cit.

10/ UNESCO Intergovernmental Oceanographic Commission, Ocean Science for the year 2000 (SC.83/D.130/A, 1984).

11/ Example, experiment in Tonga with Norwegian technology.

12/ Commonwealth Secretariat, Ocean Management, op. cit.

13/ Ocean and Shoreline Management, vol. 12, No. 4 (1989), p. 332.